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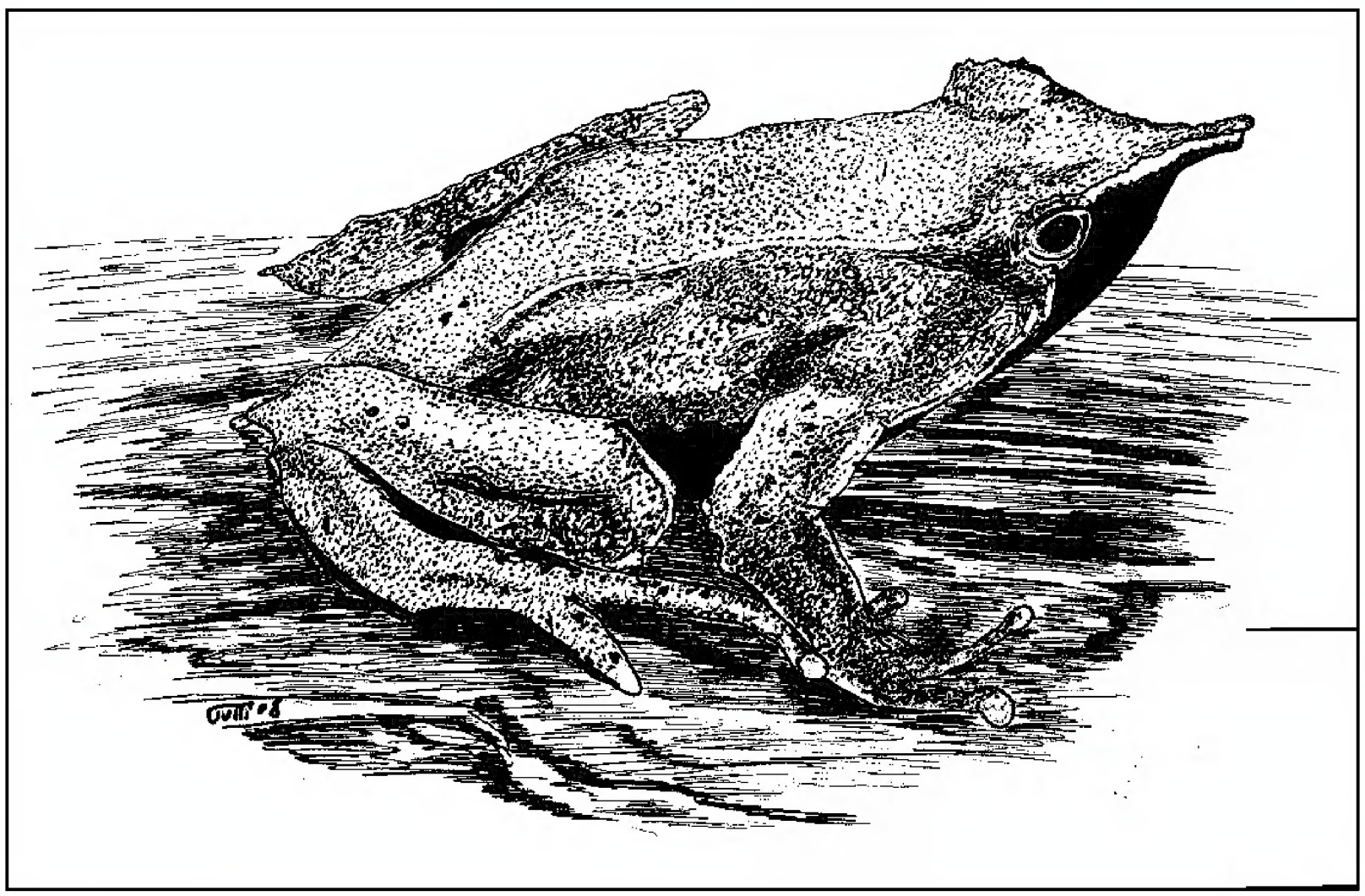

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Notes on Mexican Herpetofauna 23: An Unusual Injury to a Texas Alligator Lizard (*Gerrhonotus infernalis*) in Parque Ecológico Chipinque, San Pedro Garza García, Nuevo León, Mexico . . . Daniel Montoya-Ferrer, David Lazcano and Margarita García-Bastida 125

Kyphoscoliosis in a Dekay's Brownsnake, *Storeria dekayi*, from Erie County, Pennsylvania, USA . . . . . Brian S. Gray 127

Notes on Reproduction of Plateau Fence Lizards, *Sceloporus tristichus* (Squamata: Phrynosomatidae) . . . . . Stephen R. Goldberg 128

What You Missed at the August Meeting . . . . . John Archer 131

Herpetology 2014 134

Advertisements 136

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Notes on Mexican Herpetofauna 23: An Unusual Injury to a Texas Alligator Lizard (*Gerrhonotus infernalis*) in Parque Ecológico Chipinque, San Pedro Garza García, Nuevo León, Mexico

Daniel Montoya-Ferrer[1*], David Lazcano[1] and Margarita García-Bastida[2]

Abstract

While conducting a routine bird survey in Parque Ecológico Chipinque, a metropolitan area park in the municipality of San Pedro Garza García, Nuevo León, Mexico, during the month of January 2014, two maleTexas alligator lizards (*Gerrhonotus infernalis*) were observed. They were photographed, and later analysis of the photographic images revealed that one of the lizards had a plantlet of approximately 3 mm extending out of the ocular cavity, which appeared to be injured and contain decaying tissue. Later analysis indicated that the plantlet was a moss of the family Fissidentaceae (*Fissidens* sp).

Resumen

Durante un monitoreo de rutina de aves en el metropolitana "Parque Ecológico Chipinque" en San Pedro Garza García, Nuevo León, en mes de Enero de 2014, fueron observados un par de machos de *Gerrhonotus infernalis* (Alicante de Tierra). Éstos fueron fotografiados, al analizar las fotografías se percibió que una de las lagartijas (LHC: 175 mm; LT: 325 mm) tenía una plántula de aproximadamente 3 mm saliendo de la cavidad ocular, el ojo tenía una apariencia pútrida. Un análisis posterior demostró que la plántula se trataba de un musgo de la familia Fissidentaceae: *Fissidens* sp.

Introduction

The Texas Alligator Lizard (*Gerrhonotus infernalis*) is distributed in the U.S. from central Texas to the Big Bend region. In Mexico the species is found from the Sierra Madre Oriental westward in the states of Coahuila, Durango, Nuevo León, Tamaulipas, and San Luis Potosí, with possible isolated populations in some western states (Lemos-Espinal and Smith, 2007; Greene et al., 2009; Lemos-Espinal and Dixon, 2013). Rocky hills with scrub or oak-juniper woodlands at 1350 to 3400 m elevation are this species' preferred habitat. (Lemos-Espinal and Dixon, 2013).

Native fissidens mosses (*Fissidens* spp.) occur in humid plant communities (forests) throughout the Sierra Madre Oriental (Herrera-Paniagua and Martínez, 2014). They grow on Zapocuáhuitl (*Clethra kenoyeri*), Capulín (*Eugenia xalapensis*), American Liquidambar (*Liquidambar styraciflua*) and Elderberry (*Sambucus* spp.). The genus has a pantropical distribution (i.e., occurs in subtropical or tropical forest around the world including Mexico [Delgadillo-Moya and Cárdenas-Soriano, 2002]). It has been reported from the states of Campeche, Chiapas, San Luis Potosí, Tamaulipas and Veracruz (Sharp et al., 1994; Pursell, 2007; UNIBIO, 2012).

While conducting a bird survey on 17 January 2014, 1244 h, we came upon two male *G. infernalis* on the side of the pathway "Las Moras" in the Parque Ecológico Chipinque, in the municipality of San Pedro Garza García, Nuevo León (25°36'29.94"N, 100°21'6.33"W, datum WGS84; elev. 1185 m). While observing one of them we noted that its left ocular cavity appeared to be injured and contain decaying tissue; due to this the left side of the lizard head was also photographed. The male that was injured had the following measurements: snout–vent length = 175 mm; total length = 325 mm with a partly regenerated tail. Both lizards were photographed to document the occurrence. When the ocular cavity was closely observed, we discovered it had a plantlet of about 3 mm growing out of it. Later analysis led to the conclusion that the small growing moss was a member of the family Fissidentaceae (*Fissidens* sp.). It is likely that this phenomenon occurred due to the combination of the high humidity of the soil/subtract and an eye injury from an unknown cause. Both lizards were later released in situ. The males were found 1 m apart, but no apparent territorial behavior was observed at the time, even though both animals had bites on their mandibles that

Texas Alligator Lizard (*Gerrhonotus infernalis*), with an injury to its left eye. Photograph by Daniel Montoya-Ferrar.

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Close-up of the injured eye, showing the moss (*Fissidens* sp.) growing out of the decaying tissue. Photograph by Daniel Montoya-Ferrar.

were perhaps inflicted by other males. No blood was found on the lizards, and the scars had the appearance of past bites. Also there were no bite injuries in the eye area or cavity.

Other incidents that involved plants or their seeds that have damaged/injured lizards or even caused mortality have been documented. Loughran (2012) reported a Gila Monster (*Heloderma suspectum*) that had been affected by a grass seed of Red Brome (*Bromus madritensis* ssp. *rubens*), that was wedged into the lizard's eye causing "severe inflammation, fluid drainage in the form of pus, and the eye partially swelling closed." Recchio and Lazcano (2013) reported an incident involving the feeding habits of Isla Santa Catalina Spiny Lizard (*Sceloporus lineatulus*) on the fruit and seeds of Cardón Cactus (*Pachicereus pringlei*). The lizard got stuck to the seed pod of the cactus while feeding and succumbed to the midday heat.

However, not all plant-lizard dermal relationships are detrimental for the welfare of the host. Gradstein and Equihua (1995) found a liverwort species (*Taxilejeunea obtusangula*) growing epizoically on the head of a Smooth-headed Helmeted Lizard (*Corytophanes cristatus*), in a lowland rain forest in the vicinity of the Chajúl Biological Station in the Selva Lacandona (Reserva de Montes Azules), Chiapas, southern Mexico. Also, the Spectral Pygmy Chameleon (*Rhampholeon spectrum*) may develop a growth of liverworts on its body. This liverwort is not restricted to the head of the lizard, but can expand to cover the entire body, providing a more efficient camouflage (Glime, 2013).

Acknowledgments

We would like to thank Slivino Eduardo Hernandez-Cardenas for the identification of the moss genus and Dra. Patricia Herrera-Paniagua for her insight on the biology of the moss. We are grateful to the Universidad Autónoma de Nuevo León, Facultad de Ciencias Biológicas; Laboratories Bioclon S.A. de C.V; San Antonio Zoo & Aquarium and Los Angeles Zoo and Botanical Gardens and Parque Ecologico Chipinque A.C. for the financial support to our field work and research projects during many years. The Federal Wildlife office of Mexico SEMARNAT for issuing collecting permits for our research projects. We would also like to thank Dr. Robert L. Bezy for review of the manuscript.

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Kyphoscoliosis in a Dekay's Brownsnake, *Storeria dekayi*, from Erie County, Pennsylvania, USA

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Kyphosis is a curvature of the axial skeleton, resulting in a dorsal convex hump; whereas scoliosis is a lateral curvature of the spine. When both conditions occur together the term kyphoscoliosis is used (Rothschild et al., 2012). Kyphosis and scoliosis can be congenital or may develop later in life as a result of genetic defects, malnutrition, pathology of the epaxial muscles, infection, or trauma (Barten, 1996; Rothschild et al., 2012). In captive lizards, kyphosis or kyphoscoliosis may occur in individuals with metabolic bone disease (Boyer, 1996). Scoliosis has previously been reported in captive-born neonates of Common Gartersnakes (*Thamnophis sirtalis*) and Dekay's Brownsnakes (*Storeria dekayi*) from wild-caught females from Erie County, Pennsylvania, USA (Gray, 2003, 2013). In each case the majority of scoliotic individuals were stillborn. In a litter of 19 young *S. dekayi*, three were scoliotic with two being stillborn. The individual born alive had extreme difficulty crawling and likely was unable to survive in the wild (Gray, 2013). The following is a documentation of kyphoscoliosis in a free-ranging adult *S. dekayi* from Erie County, Pennsylvania.

On 6 August 2014 at ca. 19:40 h a female *S. dekayi* (snout–vent length 245 mm; total length 295 mm; mass 9 g) was observed at the edge of a dirt road just south of a man-made flood retention basin at a site in Erie County, Pennsylvania. The posterior half of the snake was partially concealed in the vegetation while the anterior half was on the dirt road. As I approached the snake, it flattened its body and head dorsoventrally in a manner characteristic of *S. dekayi* (Gray, in prep). After acquiring a substrate temperature (24.6°C) with a hand-held non-contact infrared thermometer, the snake was captured. Upon examination it was discovered that the snake was kyphoscoliotic with at least 17 spinal deviations (Figures 1 and 2), with the first deviation being approximately 120 mm from the snout. The kinks were most numerous on the posterior third of the snake, especially on the tail, where at least 12 such deviations were evident. Two healed injuries were found on the snake's right side, the first having corresponded with the first set of kinks.

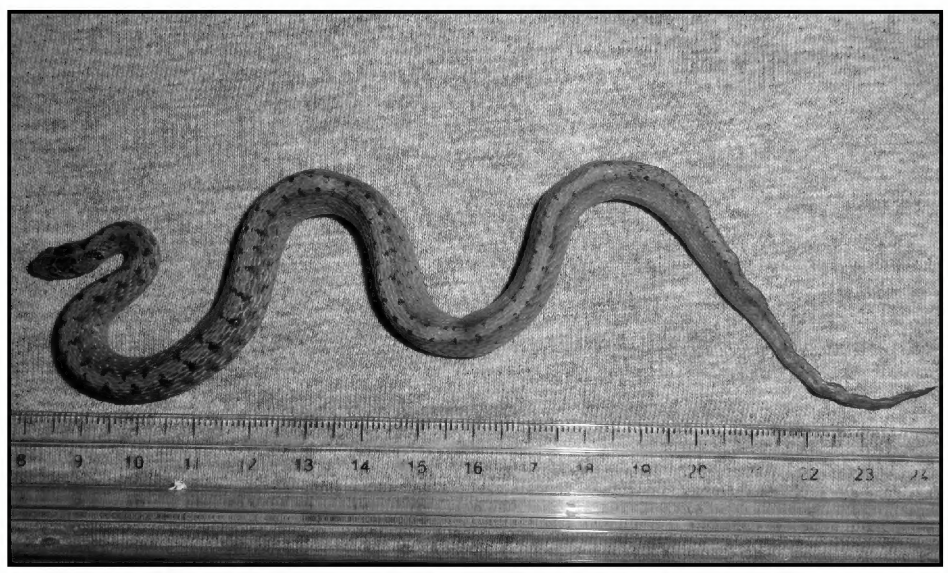

Figure 1. Dekay's Brownsnake, *Storeria dekayi*, with kyphoscoliosis in dorsal view. (Fine divisions on ruler denote millimeters.)

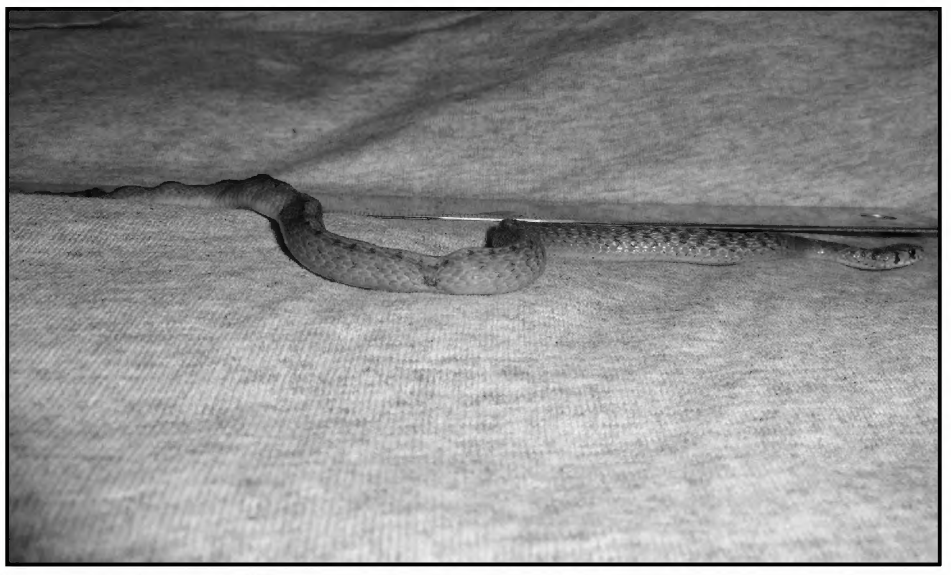

Figure 2. Dekay's Brownsnake, *Storeria dekayi*, with kyphoscoliosis in lateral view.

The second healed injury was approximately 160 mm from the snout (Figure 3). Both injuries were associated with abnormally-shaped and discolored dorsal scales. The snake's movements were somewhat labored and exaggerated. Despite her condition, this adult female otherwise appeared healthy. Her weight was within normal limits of an adult female *S. dekayi* (Gray, 2014). Furthermore, an examination of a fecal sample obtained from the snake contained five succineid snail jaws, two radulae, and a limacid slug shell, evidence of successful foraging.

The frequency of kyphoscoliosis in this population appears to be low. Excluding the three neonates, only this single instance of kyphoscoliosis was observed of 306 new captures of *S. dekayi* (0.33%) since 2012. It is probable that in most cases, as in the previously observed litters of *T. sirtalis* and *S. dekayi*, snakes with kyphosis and or scoliosis are stillborn or born with a decreased chance of survival, as evidenced by this singular find of an adult. The cause of kyphoscoliosis was most likely con-

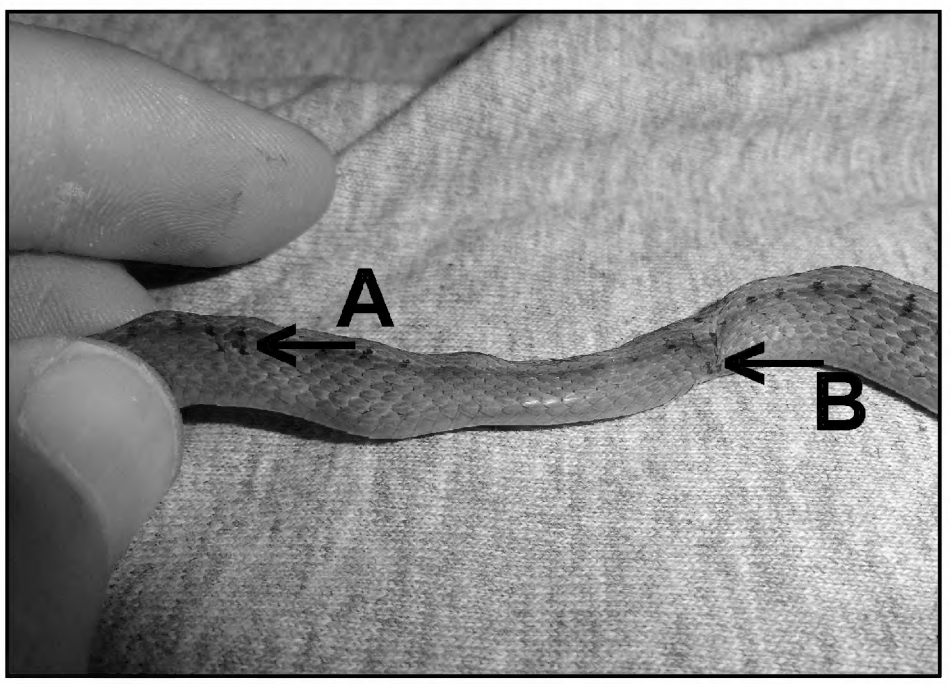

Figure 3. Close-up of healed injuries of Dekay's Brownsnake, *Storeria dekayi*, with kyphoscoliosis. The injury at A is posterior; that at B is anterior.

genital, but the result of an attack by a predator cannot be ruled out. To that end, it could have been associated with what appeared to have been a failed predation attempt responsible for her scars. The cause of her kyphoscoliosis could have a significant effect on her survivorship, if it was caused mechanically as an adult rather than having originated congenitally.

Acknowledgments

I wish to offer my sincere thanks to Jim Harding and Walter Meshaka for their comments and suggestions regarding this note.

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Notes on Reproduction of Plateau Fence Lizards, *Sceloporus tristichus* (Squamata: Phrynosomatidae)

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Abstract

A histological examination of monthly gonadal material from plateau fence lizards, *Sceloporus tristichus*, from Arizona and New Mexico revealed reproduction in males (spermiogenesis) and females (yolk deposition) commences in spring and concludes in summer. The smallest reproductively active male (recrudescence with spermatids) measured 52 mm SVL. The smallest reproductively active female (oviductal eggs) measured 54 mm SVL. Mean clutch size (n = 13) was 7.0 ± 2.1 SD, range = 4–11. One presumed neonate (SVL = 27 mm) was collected on 30 August. Some female *S. tristichus* produce two clutches in the same breeding season. *Sceloporus tristichus* is typical of other lizards from Western North America in utilizing spring as the main period of reproduction.

Sceloporus tristichus, sensu Leaché and Reeder, 2002, occurs throughout most of the Colorado Plateau region, including northern Arizona, northwestern New Mexico, eastern Utah and western Colorado (Persons and Leaché, 2009). Bartlett and Bartlett (2013) reported *S. tristichus* is common in the north central and northwestern counties of New Mexico. Because of increasing difficulty in obtaining collecting permits for large lizard samples, utilization of lizards deposited in museum collections for reproductive studies has become increasingly important. The purpose of this note is to report the results of a histological examination of gonadal material from *S. tristichus* from Arizona and New Mexico as part of an ongoing survey of the reproductive cycles of lizards from western North America.

Methods

A sample of 78 *Sceloporus tristichus* consisting of 34 adult males (mean SVL = 62.9 mm ± 7.7 SD, range = 49–80 mm), 43 adult females (mean SVL = 65.6 mm 7.4 ± SD, range = 51–83 mm) and one presumed neonate (SVL = 27 mm) collected 1929 to 2011 and deposited in the herpetology collections of the Natural History Museum of Los Angeles County (LACM), Los Angeles, California, USA, and the Museum of Southwestern Biology (MSB), Albuquerque, New Mexico, USA, was examined (see Appendix).

A small incision was made in the lower part of the abdomen and the left gonad was removed for histological examination .

Table 1. Monthly stages in the testicular cycle of 34 *Sceloporus tristichus*; * = one September male exhibited late recrudescence, characterized by common spermatids, but no sperm.

Month	N	Regressed	Recrudescent	Spermiogenesis
April	2	0	1	1
May	1	0	0	1
June	3	0	0	3
July	9	3	6	0
August	15	7	8	0
Sept.	4	0	4*	0

Histology slides were cut at 5 µm, stained by hematoxylin followed by eosin counterstain (Presnell and Schreibman, 1997) and were deposited at LACM and MSB. Enlarged ovarian follicles (> 4 mm) or oviductal eggs were counted. An unpaired *t*-test was used to test for differences between male and female mean SVLs (Instat, vers. 3.0 b, Graphpad Software, San Diego, CA).

Results

There was no significant difference (unpaired *t*-test) between male and female mean SVLs ($P = 0.120$, $t = 1.60$, $df = 75$). Three stages were present in the testicular cycle of *S. tristichus* (Table 1): (1) regression: seminiferous tubules are at their smallest size and contain 2–3 layers of spermatogonia and Sertoli cells; (2) recrudescence: a proliferation of germ cells has commenced and is evidenced by the abundance of primary or secondary spermatocytes; (3) spermiogenesis: lumina of the seminiferous tubules are lined by sperm or clusters of metamorphosing spermatids. The period of sperm production encompassed April into June (Table 1). The smallest reproductively active male (recrudescence with spermatids) measured 52 mm (LACM 97429) and was collected 16 April. One slightly smaller male (SVL = 49 mm, LACM 97431) from July, undergoing recrudescence, was subjectively judged to be of adult size.

Table 2. Monthly stages in the ovarian cycle of 43 *Sceloporus tristichus*. One female with nine oviductal eggs and concurrent yolk deposition for a second clutch had no date, and is excluded from the table.

Month	N	Quiescent	Early yolk deposition	Enlarged follicles > 4 mm	Oviductal eggs
April	2	0	1	1	0
May	2	0	1	0	1
June	9	2	0	3	4
July	11	9	0	0	2
August	17	16	0	0	1
Sept.	2	2	0	0	0

Four stages were present in the monthly ovarian cycle of *S. tristichus* (Table 2). (1) quiescent, no yolk deposition; (2) early yolk deposition (basophilic vitellogenic granules in ooplasm); (3) enlarged ovarian follicles (> 54 mm); (4) oviductal eggs. Female reproduction occurred from April into August. Mean clutch size for nine gravid females was 7.2 ± 12.2 SD, range = 4–11. The smallest reproductively active female (oviductal eggs) measured 54 mm SVL (LACM 4881) and was collected 4 July. One slightly smaller female (SVL = 51 mm, LACM 97430) from July was subjectively considered to have attained adult size. Another female with nine oviductal eggs (MSB 3391) was undergoing concurrent yolk deposition for a second clutch of eggs. The collection date was missing from the MSB database. However, there are other reports of *S. tristichus* producing multiple clutches in the same year, in the literature (Table 3). One presumed neonate (LACM 27198), SVL = 27 mm, was collected 30 August. The one August female (SVL = 62 mm) with oviductal eggs (LACM 182920) from Navajo County, Arizona, indicates some reproductive activity in *S. tristichus* in late summer. This finding was unexpected as other medium-elevation species of *Sceloporus* terminate reproduction in July (Goldberg, 1974, 1975).

Table 3. Data on reproduction of *Sceloporus tristichus* from the literature.

Locality	Reproductive period	Mean clutch size	Range	Number of clutches	Source
Arizona	Spring – summer	Not given	4–17	1 or more	Brennan and Holycross, 2005
Arizona	Spring – summer	Not given	ca. 7–10	Not given	Brennan and Holycross, 2006
Central Arizona	mid-April – mid-July	8.3	Not given	3	Tinkle and Dunham, 1986
Colorado (Mesa County)	Spring – summer	8	5–12	2	Tinkle and Ballinger, 1972
New Mexico (San Juan County)	June – July	Not given	Not given	Not given	Gehlbach, 1965
Utah	April – July	6.3	Not given	3	Tinkle, 1972
Wyoming	Mid-May – June	Not given	8–12	1–2	Lewis, 2011
Arizona, New Mexico	April – August	7.0	4–11	1–2	This paper
Total range	Spring – October	Not given	5–12	1–3	Persons and Leaché, 2009

Summary

Sceloporus tristichus is typical of the great majority of lizards from western North America (Goldberg, 2014) in adhering to a spring breeding season. This pattern is very efficient as it permits females adequate feeding which facilitates the accumulation off energy to produce eggs. As commonly occurs in other *Sceloporus* lizard species (Goldberg, 1974, 1975), *S. tristichus* terminates reproduction in summer. Yearly variations in local climate, as well as habitat differences, influence the level of lizard reproductive success. See, for example the report of Tinkle and Dunham (1986) that *S. tristichus* from central Arizona may produce three clutches of eggs per year. Also, my samples came from distinct geographic areas (Arizona and New Mexico) and were collected over a wide spectrum of years.

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Appendix

Sceloporus tristichus examined (by county) from the Natural History Museum of Los Angeles County (LACM) and the Museum of Southwestern Biology (MSB) University of New Mexico, Albuquerque.

LACM New Mexico: **Rio Arriba**: LACM 4881; **San Juan**: LACM 150807, 150808; Arizona: **Coconino**: LACM 17510, 17516, 17525, 27198, 27199, 97426-97435, 113633, 132449, 138115; **Gila**: 145243; **Greenlee**: 145259, 153310, 153311, 153338, 153340; **Navajo**: LACM 182920, 182921. **MSB** New Mexico: **San Juan**: MSB 2978, 2980, 2999, 3007, 3009, 3035, 3045-3049, 3181, 3183, 3193, 3194, 3219, 3220, 3391, 10529, 14205, 21760, 21762, 21767, 21774, 21779, 21780, 21782, 21785, 21791, 21795, 21800, 21802, 21806, 21808, 21814, 21816, 21822-21825, 37110, 48041, 48917, 60304, 79418, 79421, 79422, 79428, 79431, 79439.

Bull. Chicago Herp. Soc. 49(9):131-133, 2014

What You Missed at the August Meeting

John Archer
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Our speakers over the years have traveled to many different places conducting field research. Africa, Central and South America, Australia, Southeast Asia, South Asia, Madagascar, many other islands, and of course, North America. Conditions for the research have ranged from luxurious (but not often) to primitive and the habitat ranged from wetlands to tropical forest to desert. I've certainly seen more of the world through our speakers than I have in real life and enjoyed the tales without the travails. We've become accustomed to speakers taking us to unknown or unfamiliar places, but when Andy Snider said he would be talking about his research in Armenia, I admit I paused. Armenia? I'd heard of it. I knew that it was somewhere in the Caucasus region. I knew it wasn't very large. And now I knew that it had vipers that had been little studied. But I had to ask Andy, "Why Armenia?"

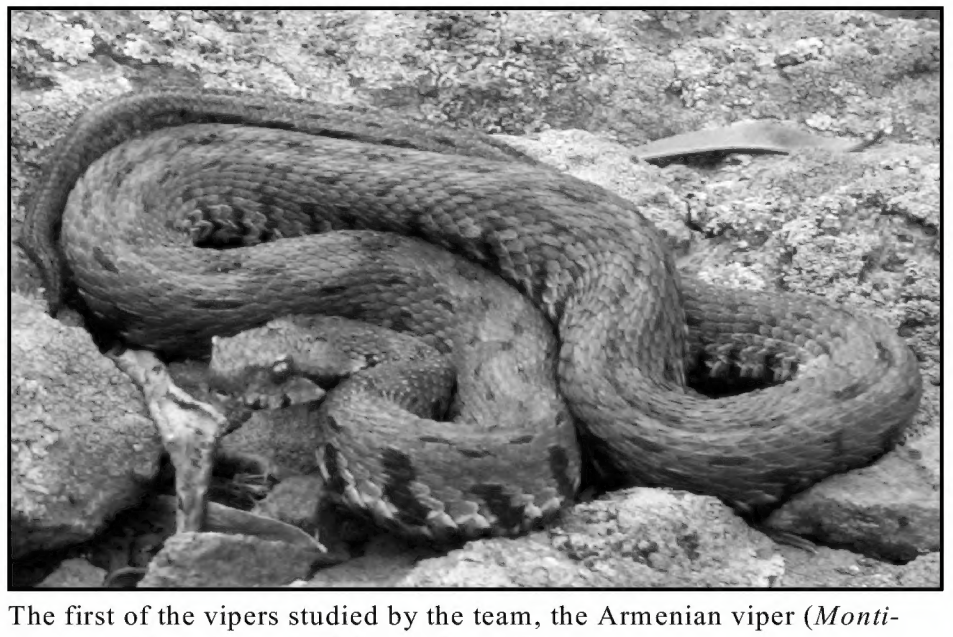
Andy Snider. Photograph by Dick Buchholz.

Andy Snider has been curator of herpetology and aquatics at the Brookfield Zoo in suburban Chicago for about six months but already is moving Brookfield towards a better herpetological collection. Previously he worked at the Fresno Chaffee Zoo and before that was instrumental in the design and building of the National Amphibian Conservation Center at the Detroit Zoo. He's engaging, humorous, and not afraid to poke fun at himself. He and Jeff Ettling of the St. Louis Zoo were in Russia discussing possible study sites with two of Russia's leading herpetologists, Dr. Natalia B. Ananjeva and Dr. Nikolai L. Orlov. While chatting over sushi one evening the group decided that the Armenian vipers deserved more study. Since 2004 Andy has been doing just that as part of what he labeled the viper "Dream Team."

Andy started with a map showing the location of the country north of Iran and east of Turkey. His adventures invariably started from the country's largest city, Yerevan. Pictures showed a thriving city and much of its "Soviet" architecture. A topographic map showed little flat land in this mostly mountainous country and we looked at the twin peaks of Mount Ararat, now in Turkey but traditionally considered as part of Armenia by the Armenians. The makeup of the teams changed from year to year, but usually included Nickolai and Natalia the Russian herpetologists, Aram the Minister of Nature Protection for Armenia, and other leading biologists from Russia, Armenia, and even Iran. Andy certainly moves in select company. We listened to brief biographies of the participants in the various teams while looking at in-field pictures of the groups.

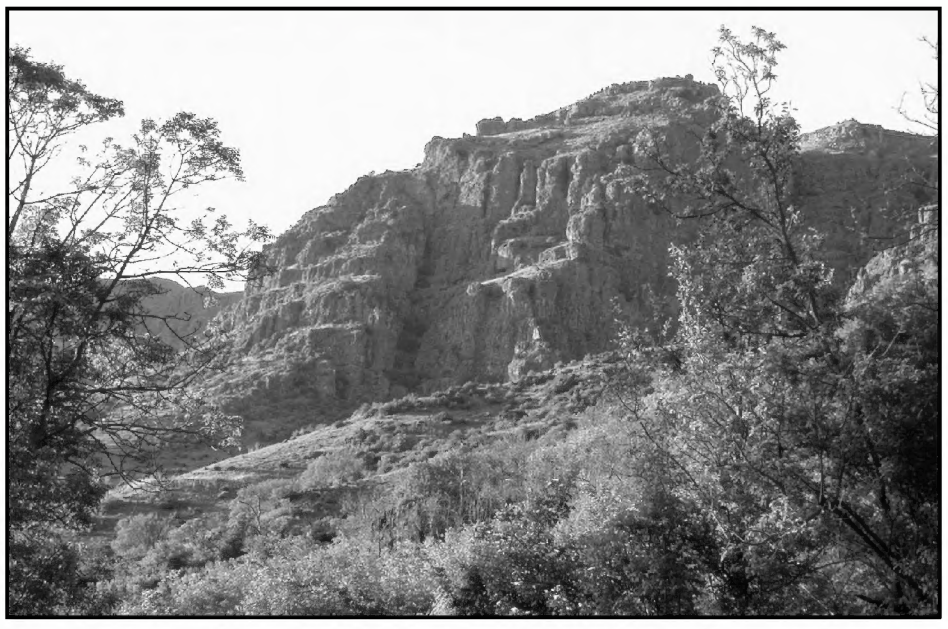
After explaining the quality of the people, Andy gave us insights into the difficulties involved in the fieldwork. The ancient Russian vehicles that were often the only means of transportation were subject to breakdowns, but there was usually someone nearby who could repair them. We pondered the plight of being in the middle of a stream when a wheel departed the vehicle. When the team was assigned a horse, it became one of the more valuable team members. The study sites were often remote and the infrastructure primitive. For the first few years they camped in tents. The addition of a trailer to a study site was definitely a step up. We saw pictures of roads or paths that were barely passable by vehicle and frequently involved steep drop offs where Andy's acrophobia caused him to regret being given the honor of the front seat when he'd rather have ridden in the trunk. Andy being a self-proclaimed plant geek, we saw pictures of wild flowers that many of us grow in gardens and planters here. Tulips, opium poppies, tiger lilies, and crocuses splashed us with colors, but one of Andy's favorites was the hen-and-chicks. He said that the other members looked at him strangely when he got excited over seeing that little plant in the wild. One plant their hosts warned them to not even brush against, though that proved next to impossible because of its ubiquity. He called it the nasty plant and showed a slide of the effects after touching the plant and then exposing the skin to light. A slide showed huge ugly blisters labeled phytophotodermatitis. That will probably be the only chance I ever get to use that word, so I had to include it. The plant is now established in the U.S. and goes by the name giant hogweed or *Heracleum mantegazzianum*, and I will certainly be wary of it the next time I'm in the field.

Of course Andy did not limit his talks to people, places, and plants. The Armenian viper (*Montivipera raddei*) is a gorgeous not particularly large animal reaching maybe four-and-a-half



The first of the vipers studied by the team, the Armenian viper (*Montivipera raddei*). Photograph by Andy Snider.

Fieldwork for the first few years meant tents and drinking from the stream. Photograph by Andy Snider.



The camp was at the base. The snakes were at the top. Photograph by Andy Snider.

Snake hooks were useless in these situations. The team used tweezers to extricate the vipers. Photograph by Andy Snider.

We all have those childhood dreams of finding animals in the wild that we've only read about. This was one of Andy's. A slow worm (*Anguis fragilis*). Photograph by Andy Snider.

Access to the study sites was often somewhat rugged. Andy decided that "road" was not applicable to this. He grudgingly called it a trail. Photograph by Andy Snider.

There are difficulties that don't crop up on all field trips. The sign carries the same warning in three languages. Photograph by Andy Snider.

Vipers weren't all the team found. This rat snake (*Elaphe sauromates*) was a bit feisty. Photograph by Andy Snider.

Andy found these three javelin sand boas (*Eryx jaculus*) together under one rock. Photograph by Andy Snider.

feet. Posed pictures let us admire the snake's beauty, but a barely visible snake hidden amongst vegetation showed how difficult the animals were to find in the wild. Andy mentioned that when training some of the team to use an antenna to locate radio-tracked snakes, one of the toughest things to get across was that the snake was located in a spot even though it couldn't be seen. Translating through two languages didn't make the task easier. The snakes were often so entwined in rocks that snake hooks were not used by the locals. They used tweezers. Andy and Jeff returned the next year with the longest tweezers they could buy.

Implanting PIT tags and radio transmitters and taking blood samples became routine with every animal captured, and the team had great success even though in the beginning the surgical table consisted of sheets of plastic laid on a flat rock. Capturing the snakes involved more than simply using tweezers. Andy showed a slide of a high, steep bluff. With a laser he pointed out the base camp at the bottom of the bluff, and then, as if reliving the climb, dragged the laser to the top of the bluff where the snakes would emerge from their winter hibernacula. Later in the year the snakes move down, but the team goes in the spring and does lots of climbing.

Andy showed us pictures of feisty rat snakes (*Elaphe sauromates*), and not so feisty rat snakes (*Elaphe hohenackeri*, now *Zamenis hohenackeri*), bold agamid lizards and beautiful green lacerta lizards, chorus frogs and pretty European green toads (*Bufo viridis*). Changing study sites allowed them to study Levantine vipers (*Vipera lebetina*, now *Macrovipera lebetina*) and meadow vipers (*Vipera eriwanensis*). One of Andy's favorite study sites was just outside of Yerevan. Lots of vipers and perhaps the best part was the road into the reserve came in at the top of the hills, allowing for a short climb down and back to find animals rather than the need to mountaineer. We saw pictures of Darevsky's viper (*Vipera darevskii*), an old Greek tortoise (*Testudo graeca*), a European pond turtle (*Emys orbicularis*), and sand boas (*Eryx jaculus*).

Throughout his talk about the trips he's made to Armenia over a period of several years, Andy stressed the friendliness of the Armenians and the interest they took in the team's research. He emphasized the point by showing signs that the team developed in three languages drawing attention to the vipers and explaining how unique they are. Two years after the signs were posted, the team returned to find them unadulterated and still posted. Would that such signs could be assured of such longevity in the U.S.

We learned much more about Armenia while Andy talked, and much more about the animals they found and the trials the team faced. Often poor roads but invariably great cell phone service. Centuries-old churches left for anyone to explore. Transportation breaking down and innovative fixes. Flora and fauna common here in captivity but found naturally in that country. Rodent trapping. A visit to Yerevan's zoo. Signs reading "Danger Mines" in three languages. The desire to study in the neighboring countries, including Georgia and Iran. As usual in science, all questions are not answered and studies remain to be accomplished. Andy plans on returning.

Andy said that at the initial discussion of study sites way back in Russia he actually favored going to Vietnam to study tree vipers. Listening to him talk and seeing the gorgeous shots he accrued, I suspect that he's not sorry that the team wound up in Armenia. I know that I had my question answered. Why Armenia? Why not? His presentation makes me want to visit one of the world's biodiversity hotspots.

Levantine vipers (*Macrovipera lebetina*) were found at high elevations. Photograph by Andy Snider.

Herpetology 2014

In this column the editorial staff presents short abstracts of herpetological articles we have found of interest. This is not an attempt to summarize all of the research papers being published; it is an attempt to increase the reader's awareness of what herpetologists have been doing and publishing. The editor assumes full responsibility for any errors or misleading statements.

GROWTH OF TIMBER RATTLESNAKES

R. D. Wittenberg and S. J. Beaupre [2014, Herpetologica 70(2): 171-183] note that habitat loss and fragmentation threaten timber rattlesnake (*Crotalus horridus*) populations in contiguous, mature forests of eastern North America, yet information regarding *C. horridus* in fragmented habitats is sparse. This study used mark–recapture data on body size and rattle morphology to compare the size at birth and per ecdysis growth rates of *C. horridus* from a fragmented habitat in west-central Missouri (MO) with those from a closed-canopy forest in northwest Arkansas (AR). The MO population is typically exposed to a shorter frost-free period than the AR population, so individuals may have less time to acquire prey. At birth, snakes in the MO population were significantly shorter than those from AR, but MO snakes increased in length more rapidly than AR snakes through their first eight ecdyses. Sexual size dimorphism was apparent in the MO population—males and females diverged in size between the fifth and sixth ecdyses. Growth trajectories of AR males and females remained indistinguishable through the first eight ecdyses. *Crotalus horridus* in the agriculturally fragmented habitat may have grown faster than their forest-dwelling counterparts because fields and edges provide prey with stable food sources, unlike the boom and bust production typical of acorn mast crops. Although previous studies have demonstrated that *C. horridus* growth rates vary along latitude and elevation gradients due to climatic constraints on foraging, this study suggests that prey abundance may be just as important in shaping variation in life history both within and among populations.

THE SOUTHERN HOGNOSE IN NORTH CAROLINA

J. C. Beane et al. [2014, Copeia 2014(1):168-175] note that the southern hognose snake (*Heterodon simus*) is a poorly known and declining species in the southeastern U.S. They conducted road surveys during 1985–2012 and accumulated 764 observations of this species from the sandhills and southeastern Coastal Plain of North Carolina. This study reports information on the size, sex ratio, diet, diel and seasonal activity patterns, and population trends of this rare species. Results show that sexual dimorphism is biased toward larger females in this species, and that sex ratios are even in young size classes but become skewed toward males in adult size classes. Observations of this species peak during September–October, and most observations occurred from late morning through early afternoon during this seasonal peak of activity. The authors observed this species in similar numbers for the past 28 years, and no historical trend in encounter rates was discernible. Recorded dietary items were made up almost entirely of the lizard *Aspidoscelis sexlineata* and the anuran *Scaphiopus holbrookii*. This study fills important gaps in our understanding of this rare species, provides an important baseline useful for future researchers or researchers in other regions, and provides information useful for developing effective management strategies and search protocols for *H. simus*.

LIVE REPTILE AND AMPHIBIAN TRADE

A. Herrel and A. van der Meijden [2014, The Herpetological Journal 24(2):103-110] note that the trade in wildlife is a globally important industry. Amphibians and reptiles are among the most commonly traded animals and this trade has raised concern because of its potential impact on natural populations, animal welfare and the spread of invasive species and emerging infectious diseases. Yet, evaluating the risks involved is difficult due to the lack of quantitative data on the trade. The authors analyze data on the live reptile and amphibian trade in the USA and the worldwide trade in CITES-listed species over a ten-year period. Their analyses show that the trade is dominated by only a few species, with ten species making up the majority of the trade. Moreover, the data show an increase of the contribution of captive-bred specimens to the trade in the USA, but not worldwide. The data also show the presence of several invasive species among those that are traded and bred most. The authors suggest that the trade of potential invasive species is problematic and should be more strictly regulated as it may have a global impact on biodiversity and the spread of emerging infectious diseases.

EVOLUTION OF VIVIPARITY IN REPTILES

R. Shine [2014, J. Herpetology 48(2):147-161] notes that most reptiles are oviparous (egg-laying), but viviparity (live-bearing) has evolved about 100 times in lizards and snakes. Geographic biases in the distribution of viviparous species stimulated the "cold-climate hypothesis," proposed independently by three field-based researchers in the early 1900s. Mell (in China) and Weekes (in Australia) viewed viviparity as a mechanism for thermal buffering of embryos from nighttime frosts, whereas Sergeev (in Russia) suggested that eggs retained in utero would develop faster because they were kept warmer, enabling early hatching. Although alternative adaptationist hypotheses proliferated over the next few decades, many had logical flaws (failing to consider intermediate stages). Phylogenetically based analyses identified around 100 independent origins of viviparity from oviparity, and revealed a strong trend for viviparity to evolve in cold climates. After experimental studies showed that incubation temperatures affect offspring phenotypes as well as rates of development and survival, the author proposed (in 1995) that by retaining eggs in utero, a mother can manipulate the phenotypic traits of her offspring (and thus, enhance their fitness). This mother of all hypotheses subsumes the cold-climate hypothesis, and has been supported by studies on both oviparous and viviparous squamates, and in tropical as well as cold-climate areas. The history of this research topic illustrates the emergence of similar ideas from different researchers (sometimes creating tensions); the major roles of happenstance and field experience in suggesting ideas and allowing them to be tested; and the vital contributions of concepts, methodologies, and technologies from other fields to the understanding of reptilian viviparity.

REVISION OF THE NEOTROPICAL BIRDSNAKES

R. C. Jadin et al. [2014, Journal of Zoological Systematics and Evolutionary Research 52(3):257-264] note that the genus *Pseustes* Fitzinger, 1843, is composed of three recognized species, *Pseustes poecilonotus*, *P. shropshirei* and *P. sulphureus*. The latter may be the largest colubrid snake in the New World. The group has a complex systematic history that has yet to be untangled using modern molecular phylogenetic approaches. The systematic position, within-group diversity and distribution are therefore uncertain. The authors obtained samples of four species from multiple specimens across their distribution and analyzed one nuclear and two mitochondrial genes to determine the phylogenetic placement of the genus and infer relationships among *Pseustes* lineages. They found strong support for the paraphyly of *Pseustes* with respect to the monotypic genus *Spilotes*, both of which are nested within a clade of at least 23 other New World Colubrinae genera. Based on these results, they formally revise the taxonomy of *P. poecilonotus* and *P. sulphureus*, resurrecting the taxon *P. polylepis* for populations of *P. poecilonotus* from South America and allocating *P. sulphureus* to the genus *Spilotes*, which renders both genera monophyletic. Additionally, they identify two lineages that are putatively new and currently unrecognized species. Finally, the placement of *P. sulphureus*, the type species of *Pseustes*, in the genus *Spilotes*, requires the allocation of the senior synonym *Phrynonax* be considered for the remaining *Pseustes* taxa.

MAP TURTLES OF THE MERMENTAU

E. L. Ilgen et al. [2014, Chelonian Conservation and Biology 13(1):1-8] note that the Mermentau River drainage in Louisiana has been largely ignored by turtle biologists, despite historical records of its turtle species. In particular, almost nothing is known about the range and abundance of the Sabine map turtle (*Graptemys sabinensis*) in the Mermentau drainage, which is frequently omitted from descriptions of the species' range. Four specimens of *G. sabinensis* were collected from the upper Mermentau in 1893 and 1894, but no trapping of the species has been conducted in the drainage since. The authors determined basking density and relative abundance among basking turtles for Sabine map turtles in the Mermentau drainage, including the Mermentau, Lake Arthur, and 5 major tributaries. They recorded turtles seen during boat surveys and in point-counts from bridges and other access points. The Mermentau and Bayou Plaquemine Brule had the highest basking densities, ranging from 14.0 to 34.5 *G. sabinensis* per river kilometer. Bayous des Cannes and Nezpique and Lake Arthur had intermediate average densities of 5.0–9.7 *G. sabinensis* per river kilometer and the river below Lake Arthur and the southern tributaries, Bayou Queue de Tortue and Lacassine Bayou, had the lowest average basking densities, ranging from 0.7 to 1.4 *G. sabinensis* per river kilometer. Sabine map turtles were the most abundant basking turtle on the Mermentau drainage, accounting for 73% of all turtles seen. *Graptemys pseudogeographica*, the false map turtle, accounted for only 0.2% of all turtles observed and is approaching extirpation in the drainage, likely due to the near total eradication of mussels that has resulted from extensive dredging of the Mermentau and its major tributary bayous.

HIGH-LATITUDE PLAINS GARTERSNAKES

K. N. Tuttle and P. T. Gregory [2014, Copeia 2014(1):130-135] ask "Do high-latitude environments constrain life histories of ectotherms?" One expectation is that shorter and cooler active seasons at high latitudes limit opportunities for maintenance of optimum body temperature and restrict time for foraging and therefore for growth and reproduction. Thus, under this hypothesis, individuals in high-latitude populations of wide-ranging species would be predicted to grow more slowly, have lower reproductive output, and perhaps reproduce less frequently than lower-latitude conspecifics. However, at Miquelon Lake in central Alberta, the plains gartersnake (*Thamnophis radix*) grows as fast annually as more southerly conspecifics and reaches sexual maturity at the same age. A comparable test is made of latitudinal variation in reproductive traits. Both litter size and offspring size were larger in the Miquelon Lake population than at lower latitudes. Moreover, female snakes could reproduce annually, although the frequency of annual reproduction remains unknown. Litter size was positively related to female size, but also varied annually, apparently in relation to the previous year's weather (higher litter size with lower rainfall and higher temperature the previous year); the most parsimonious interpretation of this observation is that warm, sunny weather facilitates the acquisition of capital resources for the subsequent year's reproduction. Overall, the Miquelon Lake snakes appear to have a "fast" life history, presumably as a result of a productive environment that provides an abundance of anurans, which constitute the primary prey of *T. radix* at this site, but this hypothesis is untested.

CAPTIVE CENTRAL AMERICAN RIVER TURTLES

J. A. Rangel-Mendoza et al. [2014, Chelonian Conservation and Biology 13(1):96-109] conducted health evaluations in two captive colonies of Central American river turtles, *Dermatemys mawii*, from sites in Tabasco, Mexico: Government of the State of Tabasco's turtle farm (GOV) and Arroyo Tabasquillo turtle farm (TAB). Health assessments were conducted in February, May, and August. Each assessment included a group clinical history, physical examinations, serum biochemistry panels, and bacteriological analyses. Additionally, water quality of turtle ponds was analyzed monthly at each site. High frequency of shell lesions and other clinical signs related to a harmful aquatic environment were found at both farms. Serum biochemistry results include levels of urea in both farms that repeatedly exceeded reference values for this species and values greater than normal for total protein, uric acid, and triglycerides at TAB. Bacteriological results showed potentially pathogenic microorganisms in lesions, including *Staphylococcus aureus*, *Escherichia coli*, *Proteus vulgaris*, *Serratia* spp., *Klebsiella* spp., and *Candida* spp. Water quality in both farms was poor; water at TAB presented the worse quality due to its high levels of total ammonia nitrogen (median 1.092 mg/l), nitrite (median 0.011 mg/l), fecal coliform (median 4600 MPN/100 ml), and water transparence (median 0.05 m) and low level of dissolved oxygen (median 0.6 mg/l). In general, the health of captive turtles was compromised at both farms, the most likely factors being inadequate water management, overcrowding, and dietary problems.

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UPCOMING MEETINGS

The next meeting of the Chicago Herpetological Society will be held at 7:30 P.M., Wednesday, September 24, at the Peggy Notebaert Nature Museum, Cannon Drive and Fullerton Parkway, in Chicago. **Colette Adams**, general curator at the Gladys Porter Zoo in Brownsville, Texas, will speak about conservation of the critically endangered Philippine crocodile (*Crocodylus mindorensis*). This talk will highlight the creative conservation initiatives underway in the municipality of San Mariano in northern Luzon—one of the two last strongholds of Philippine crocodiles in the wild.

The speaker at the October 29 meeting will be **Chris Gillette**, wildlife biologist, photographer, and adventurer born and raised in Florida. Chris is perhaps best known from the cable TV show "GatorBoys."

The regular monthly meetings of the Chicago Herpetological Society take place at Chicago's newest museum—the **Peggy Notebaert Nature Museum**. This beautiful building is at Fullerton Parkway and Cannon Drive, directly across Fullerton from the Lincoln Park Zoo. Meetings are held the last Wednesday of each month, from 7:30 P.M. through 9:30 P.M. Parking is free on Cannon Drive. A plethora of CTA buses stop nearby.

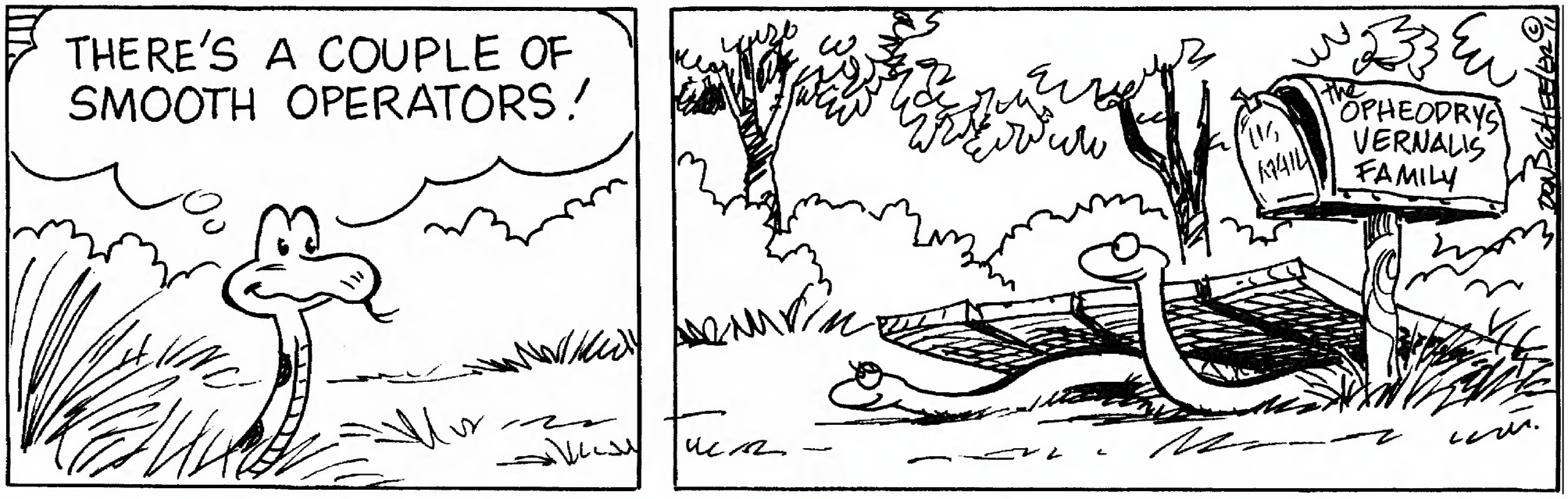
Board of Directors Meeting

Are you interested in how the decisions are made that determine how the Chicago Herpetological Society runs? And would you like to have input into those decisions? If so, call Mike Dloogatch, 773-566-0728, for the date and place of the October board meeting.

The Chicago Turtle Club

The monthly meetings of the Chicago Turtle Club are informal; questions, children and animals are welcome. Meetings normally take place at the North Park Village Nature Center, 5801 N. Pulaski, in Chicago. Parking is free. For more info visit the group's Facebook page.

THE ADVENTURES OF SPOT



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